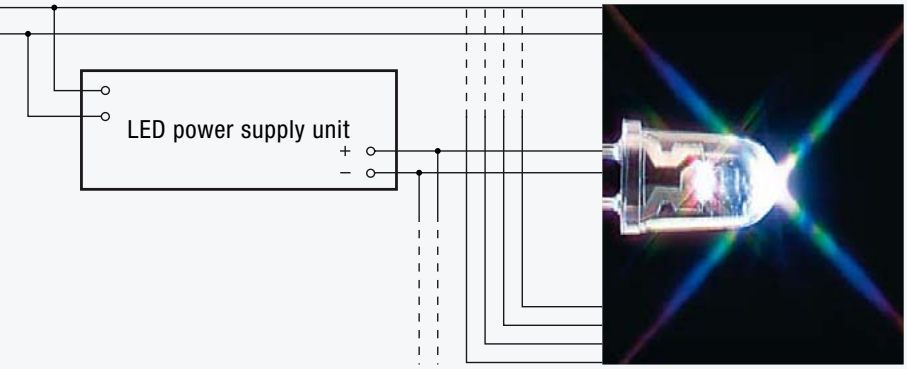
ZUMTOBEL



LED guide

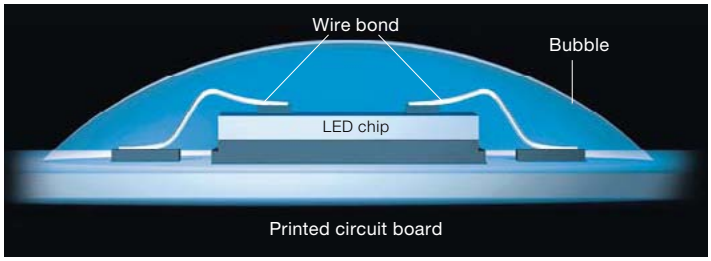
Design, planning and installation guide with tips and tricks for the use of LED installations.

What is LED?

Zumtobel has always been known as a pioneer of LED technology and utilises it for a wide variety of applications for indoor and outdoor lighting, in both decorative and functional areas. Constantly increasing levels of luminous flux and the development of efficient optical systems open the way for ever more interesting lighting solutions for light projection applications.
An impressive example is the lighting stage set at the new FIFA headquarters in Zurich.
Depending upon application and required lighting technology, three different types of LED were installed.

SMD LEDs (Surface Mounted Device LEDs)
These are bonded onto the surface of the printed circuit board and are contacted in the soldering bath. The linear LED board in KAVA LED, for example, is equipped with LEDs featuring SMD construction.

Chip-on-Board LEDs
After the LED chip is bonded directly onto the board and is contacted via the “bond wires”, a bonded epoxy lens, the so-called “bubble”, defines light distribution. According to the design of the bubble, a COB LED can have extremely narrow-beam or extremely wide-angle distribution.



High current LEDs
As part of the continuous development of LEDs for lighting industry purposes, focus is being increasingly shifted from decorative lighting applications to illumination. The LED chip must become significantly larger. In order to achieve full output, power supply is not 10–30 mA as with the small chips, but from 350 to over 700 mA, demanding a completely new LED design. High current LEDs are integrated within a heat sink that is able to take up the heat from the chip very efficiently and transfer it directly to a larger cooling surface.

Fluorescent principle
or luminescence conversion

White LED light can be created by two processes: firstly by RGB colour mixing, where a neutral, somewhat indefinable white is created when the “colour triangle” is passed through. The second, standard process for creation of white LED light is based upon the principle of luminescence conversion.

A fluorescent layer similar to that found in a fluorescent lamp is incorporated above a blue LED chip, so that a part of the light band is converted into white light. According to the composition of the conversion substance, colour temperature ranges from warm to cool white.

Advantages and limitations of LED

Benefits

Long service life
According to design, LEDs achieve a service life of up to 50 000 hours and more. This translates into long maintenance intervals.

Low energy consumption
As part of the CO_2 debate, energy efficiency is becoming increasingly important. The luminous flux per watt of today's LED generations is well above that of low voltage halogen luminaires, and according to colour temperature is currently between 40–80 lm/W.

Gentle light
LEDs develop low levels of heat on luminaire surfaces because of their UV/IR-free light, making them ideal for conservational lighting.

White LED light
Colour temperatures ranging between warm and cool can be generated today with standardised types of LED.

Coloured and dynamic light
LEDs create light directly in different colours. Coloured LEDs can be combined into clusters and controlled in order to generate colour mixes and dynamic colour sequences (RGB technology).

Control of LEDs
LEDs are semiconductor devices that can be efficiently dimmed or dynamically controlled.

Benefits of LED technology compared to low voltage halogen
Compared to low voltage halogen, one of the main advantages is IR/UV-free light and its absence of heat radiation. The energy efficiency of LEDs is much higher than that of low voltage halogen luminaires.

Benefits of LED technology compared to fluorescent lamps
Advantages compared to fluorescent lamps are somewhat less. In addition to conservational lighting and long maintenance intervals, the main benefit of LEDs is projected light.
Lens optics allow optimal light direction onto the targeted area, allowing illumination output to be much more efficiently implemented. In addition, cove lighting in dynamic colours with RGB LED solutions, for example, can be created space-savingly and with a high level of efficiency.

Further benefits:
- Saturated colours
- Optimal operation at low temperatures
- Resistance to vibration and impact

Limitations

Energy efficiency levels for LED are at present lower than with the following lamp technologies:
– Fluorescent lamps: 80–100 lm/W
– High pressure halogen lamps: 90–100 lm/W
– High pressure sodium vapour lamps: 100–120 lm/W
– LED: 40–80 lm/W

LEDs are not at ease with high ambient temperatures, and in these conditions (in saunas for example), luminous flux and service life of the LEDs are negatively affected.

The board of high output LEDs becomes very hot. In order to ensure a luminaire service life of 50 000 hours, the board must be efficiently cooled (e.g. with cooling ribs, fan cooling or water cooling).

LED luminaire types

Voltage-controlled luminaires with 24 V

Conventional LEDs
e.g.: LEDOS, KAVA,
SYSTEMLED DECO

Decorative applications
e.g.: light points, light lines.

Luminaires are measured in volts and watts
The number of luminaires per control gear unit depends upon their total output (watt/ampere).

e.g.:
24 V, 25 W power supply unit
↓
SYSTEMLED DECO each
10 W (= 1007 mm),
2 W (= 207 mm)
↓
1 24 V, 25 W power supply unit for max.
2 SYSTEMLED each 10 W, and
2 SYSTEMLED each 2 W

Luminaires are connected in PARALLEL

Zumtobel luminaire ranges
LEDOS M
LEDOS B
LEDOS recessed floor luminaires
LEDOS II
KAVA LED
SYSTEMLED DECO/FLOOD

Current-controlled luminaires with 350 mA

Power LEDs
e.g.: ORILED,
PANOS S 100 LED, PASO II RGB

Decorative applications / projected light
e.g.: light cone, directional light.

Luminaires are measured in volts and watts
The number of current-controlled LEDs per control gear unit depends upon the respective wattage and current available to that control gear unit.
According to manufacturer, current-controlled LEDs require a current of up to 4 volts.

e.g.:
350 mA constant current power supply unit, 24 V / 8 W on the secondary side.
↓
3 x 2.5 W = 7.5 W
6 x 4 V = 24 V
↓
1 350 mA constant current power supply unit
3 ORILED, each 2.5 W (2 LEDs, each 4 V).

Luminaires are connected in SERIES

Zumtobel luminaire ranges
ORILED 350 mA
PASO II RGB
PANOS S 100 LED

Luminaires with 230 V

Properties

- Number of luminaires unlimited.
- Easy planning/installation.

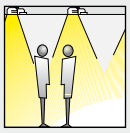
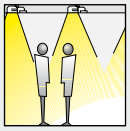
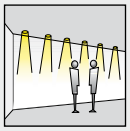
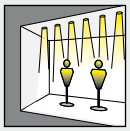
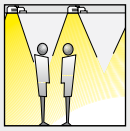
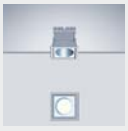
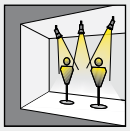
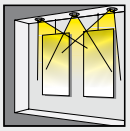
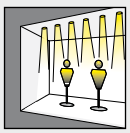
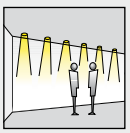
230 V LED luminaires are generally not dimmable / regulable. Exceptions are luminaires having a separate control input or control button.
e.g.:
ORILED 230 V
PHAOS Line RGB
PANOS 150 LED
2LIGHT Mini LED

Zumtobel luminaire ranges

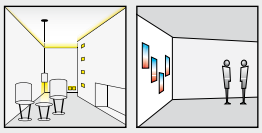
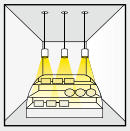
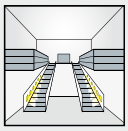
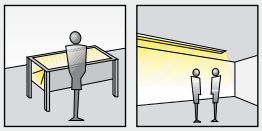
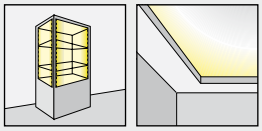
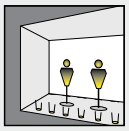
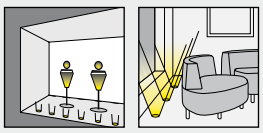
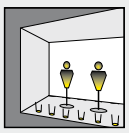
LEDOS M
LEDOS B
LEDOS recessed floor luminaires
LEDOS II
PHAOS line
ORILED 230 V
PANOS 150 LED
2LIGHT Mini LED
SCONFINE CUBO
PASO II

Application possibilities for LEDs

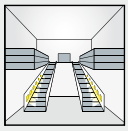
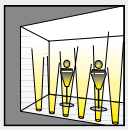
Typical lighting solutions and product categories

Typical applications	Properties	Supply	Switchable/ dimmable*	Monochrome/ RGB	Indoor/outdoor applications	Product
	▪ 1000 lm and 2000 lm as an alternative to 18 W / 26 W compact fluorescent lamps ▪ Colour temperatures of 3000 K (from February 09) and 4000 K (from November 08)	230 V	switchable, dimmable DALI (from February 2009)	white	indoor applications	 PANOS PureWhite
	▪ 1000 lm projected light ▪ Colour temperature adjustable from 2700–6500 K ▪ RGB colour dynamism via EMOTION touch panel or DMX ▪ Availability planned for November 2008	230 V	dimmable DALI (via Emotion touch panel)	control of white light via RGB RGB	indoor applications	 PANOS BioMotion
	▪ Swivelling recessed downlights for decorative accent lighting	350 mA	switchable, dimmable	white blue	indoor applications	 PANOS S
 	▪ 350 lm projected light as an alternative to 20 W low voltage halogen ▪ Indirect RGB light for “mellow downlight” effect in dynamic colours	24 V	switchable, dimmable DALI	RGB + white	indoor applications	 2LIGHT MINI RGB/W
	▪ 1000 lm as an alternative to 18 W compact fluorescent lamps ▪ Colour temperatures of 3000 K (from February 09) and 4000 K (from November 08)	230 V	switchable, dimmable DALI (from February 2009)	white	indoor applications	 2LIGHT MINI Pure Wh.
 	▪ 1100 lm projected light with 3000 K ▪ 1300 lm projected light with 4000 K ▪ Projected LED accent light as an alternative to 75 W low voltage halogen ▪ Available from spring 2009	230 V	switchable, dimmable DALI (via Emotion touch panel)	white	indoor applications	 VIVO LED
 	▪ 300 lm projected light ▪ 3000 K and 4700 K colour temperatures	24 V	switchable, dimmable	white	indoor applications	 MICROS
	▪ System combines miniaturised LED spots for accent lighting with T16 fluorescent lamps for wallwashing ▪ LED light lines for room illumination and atmospheric lighting effects	24 V 230 V	switchable, dimmable	white RGB (light lines)	indoor applications	 SUPERSYSTEM

* with 24 V and 350 mA luminaires, dimmability is dependent upon type of control gear!

Typical applications	Properties	Supply	Switchable/ dimmable*	Monochrome/ RGB	Indoor/outdoor applications	Product
	▪ Single and nine-fold modules ▪ Nine-fold modules feature dynamic light design whereby the individual lighting cubes can be randomly dimmed up and down	230 V	switchable	monochrome	indoor applications	 SCONFINE CUBO
	▪ Colour temperature via control button in six pre-defined steps from 2700–6500 K ▪ Luminaire is part of the SCONFINE pendant luminaire series	230 V	switchable, dimmable	white	indoor applications	 SCONFINE SFERA
	▪ Illuminance in accordance with EN 1838 for additional emergency lighting close to ground level ▪ Unique lens/reflector optic ensures optimal light distribution on the floor ▪ 3000 K / 5400 K available	230 V 350 mA	switchable, dimmable	white blue	indoor applications outdoor applications	 ORILED
	▪ Modular LED light line system for individual, slot and channel mounting ▪ Not suitable for installation in floors!	24 V	switchable, dimmable	white blue RGB	indoor applications outdoor applications	 SYSTEMLED FLOOD
	▪ Modular LED light line system for individual, slot and channel mounting ▪ SYSTEMLED Deco Basic optimised for cove lighting ▪ Not suitable for installation in floors!	24 V	switchable, dimmable	white blue RGB	indoor applications outdoor applications	 SYSTEMLED DECO
	▪ IP68 version for underwater lighting ▪ Walk-over capacity to max. 1000 kg	230 V 24 V	switchable, dimmable	yellow red green white blue	indoor applications outdoor applications	 LEDOS M
	▪ Accent spotlight (spot/flood) ▪ Walk-over capacity to max. 1000 kg	230 V 24 V 350 mA	switchable, dimmable	white blue RGB	indoor applications outdoor applications	 LEDOS B
	▪ 3000 K / 5700 K available ▪ Uniformly illuminated light points or surfaces ▪ Walk-over capacity to max. 1000 kg	230 V 24 V	switchable, dimmable	white blue RGB	indoor applications outdoor applications	 LEDOS

* with 24 V and 350 mA luminaires, dimmability is dependent upon type of control gear!

Typical applications	Properties	Supply	Switchable/ dimmable*	Monochrome/ RGB	Indoor/outdoor applications	Product
	■ Diffuser with transparent sides gives the luminaire unit a floating appearance ■ Model without frame also available	230 V 24 V	switchable, dimmable	white blue RGB	indoor applications outdoor applications	 PHAOS LINE
 	■ Extremely easy wiring via self-tapping cable connector for indoor applications	230 V 24 V	switchable, dimmable	yellow red green white blue RGB	indoor applications outdoor applications	 PASO II LED
 	■ Walk-over capacity to max. 500 kg ■ RGB models feature integrated DALI power supply unit ■ Also available as a wall-mounted version	230 V	switchable, RGB dimmable DALI	white blue RGB	indoor applications outdoor applications	
 	■ “Glass only” model available for indoor applications ■ Walk-over capacity to max. 1000 kg	230 V 24 V 350 mA	switchable, dimmable	white blue RGB	indoor applications outdoor applications	

* with 24 V and 350 mA luminaires, dimmability is dependent upon type of control gear!

5 criteria check

In order to define the scope and correct design of an LED system, the following criteria must be taken into account when planning:

1. Light colour

Monochrome or RGB?

2. Switching mode

On/Off, potentiometer or SwitchDim, DALI etc.?

3. Luminaires / luminaire output

Which luminaires are to be used?
Voltage-controlled in watts (W) or current-controlled in amperes (mA) or volts (V)?

4. Luminaire type

Voltage-controlled or current-controlled?

5. Cable length / cross-section

Cable lengths between power supply unit and luminaire, and positioning of control gear must be considered. These are dependent upon power consumption and cable cross-section. See page 12 for details (tables).

Example 1, monochrome installation:
Dimmable installation with KAVA LED, SYSTEMLED DECO

Work step	Check	Customer requires
Monochrome / RGB?	✓	Monochrome
Switchable / dimmable / controllable? Potentiometer / SwitchDim / DALI?	✓	Dimmable SwitchDim
Which luminaires are to be used?	✓	5 KAVA LED in white (= 8 W) 8 m SYSTEMLED DECO in white (= 80 W)
Voltage-controlled? Current-controlled?	✓	24 V voltage-controlled
Check cable lengths (see page 12)	✓	Cable lengths OK
Control gear?	→	1 100 W power supply unit (24 V) 1 dimmable K210 power supply unit (24 V) 1 PWM amplifier C004* **The installation works!**

Example 2, RGB installation:
DALI-controlled installation with 5 KAVA LED RGB, 4 m SYSTEMLED DECO RGB, 4 m SYSTEMLED FLOOD RGB

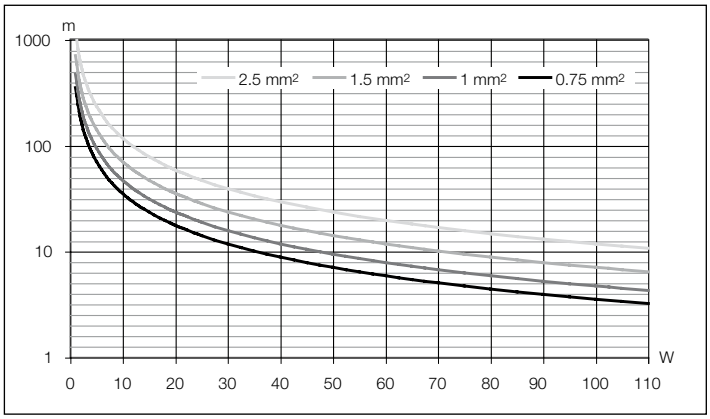
Work step	Check	Customer requires
Monochrome / RGB?	✓	RGB
Switchable / dimmable / controllable? 3 potentiometers / DALI / 0-10 V?	✓	Controllable DALI with EMOTION TOUCH
How many luminaire groups?	✓	3 groups (KAVA/DECO/FLOOD)
Which luminaires are to be used?	✓ ✓	5 KAVA LED in RGB (= 10.5 W) 4 m SYSTEMLED DECO in RGB (= 100, 8 W) 4 m SYSTEMLED FLOOD in RGB (= 92, 44 V)
Voltage-controlled? Current-controlled?	✓	24 V voltage-controlled
Should all luminaires within the group have synchronous colour changes?	✓	YES
Check cable lengths (see page 12)	✓	Cable lengths OK
Control gear?	→	1 240 W (24 V) power supply unit for installation in switch cabinet 1 dimmable K210 power supply unit (24 V) 1 PWM amplifier C004* **The installation works!**

* C004 amplifier because power output of K210 or K211 is exceeded.

Cable lengths / cross-sections

Cable length vs. active power for 24 V DC supply

Cable lengths are limited exclusively on the assumption that a maximum voltage drop of 0.7 V is permissible.

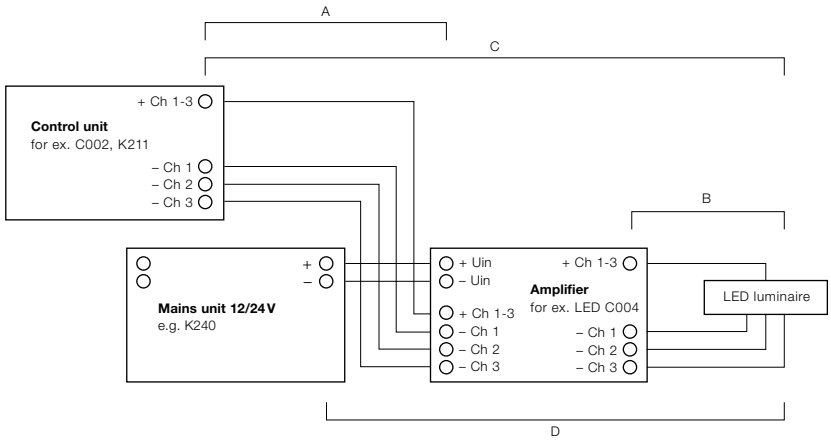


			Cable cross-section/length			
Output	Current	Voltage	0.75 mm²	1 mm²	1.5 mm²	2.5 mm²
10 W	0.417 A	24 V	35.0 m	47.0 m	70.5 m	117.5 m
15 W	0.625 A	24 V	23.5 m	31.0 m	47.0 m	78.5 m
20 W	0.833 A	24 V	17.5 m	23.5 m	35.0 m	60.0 m
30 W	1.250 A	24 V	11.5 m	15.5 m	23.5 m	39.0 m
40 W	1.667 A	24 V	8.5 m	11.5 m	17.5 m	29.5 m
50 W	2.083 A	24 V	7.0 m	9.0 m	14.0 m	23.5 m
60 W	2.500 A	24 V	5.5 m	7.5 m	11.5 m	19.5 m
70 W	2.917 A	24 V	5.0 m	6.5 m	10.0 m	16.5 m
80 W	3.333 A	24 V	4.0 m	5.5 m	8.5 m	14.5 m
90 W	3.750 A	24 V	3.5 m	5.0 m	7.5 m	13.0 m
100 W	4.167 A	24 V	3.5 m	4.5 m	7.0 m	11.5 m
110 W	4.583 A	24 V	3.0 m	4.0 m	6.0 m	10.5 m

Please note: Maximum voltage drop permissible: 0.7 V

RGB and dimming of LED luminaires

For “dimming applications”, owing to partly high outputs and accordingly possible interferences with electromagnetic compatibility, other points must be taken into account:



A: control unit to LED C004 amplifier
The cable between control unit and amplifier (LED C004) may be up to 20 m long. Make sure that the minimum input voltage of the amplifier’s control input is at least 12 V.

B: LED C004 amplifier to first LED luminaire
C: control unit to LED luminaire / luminaire group
In order to avoid interferences with electromagnetic compatibility, the use of shielded cables for the lead between control unit and LED luminaires is recommended for cables longer than 0.5 m. Even if cables are shielded, cables longer than 15 m may lead to electromagnetic compatibility interferences in highly sensitive areas.

D: mains unit to LED luminaire / luminaire group
The maximum cable length between mains unit and last LED luminaire is specified in the table. Control gear should possibly be placed next to the luminaires.

Cable length for supply of current-controlled LEDs, switchable

Cable lengths are limited purely by the assumption that a maximum voltage drop of 0.7 V is permissible. They always relate to the last luminaire in the group.
It is assumed that control gear is utilised to full capacity – for details, please consult the technical descriptions of the control gear. A minimum voltage of 4.5 V is assumed per LED.

Note: please use copper wiring. Do not install cables parallel to power cables / high voltage cables.

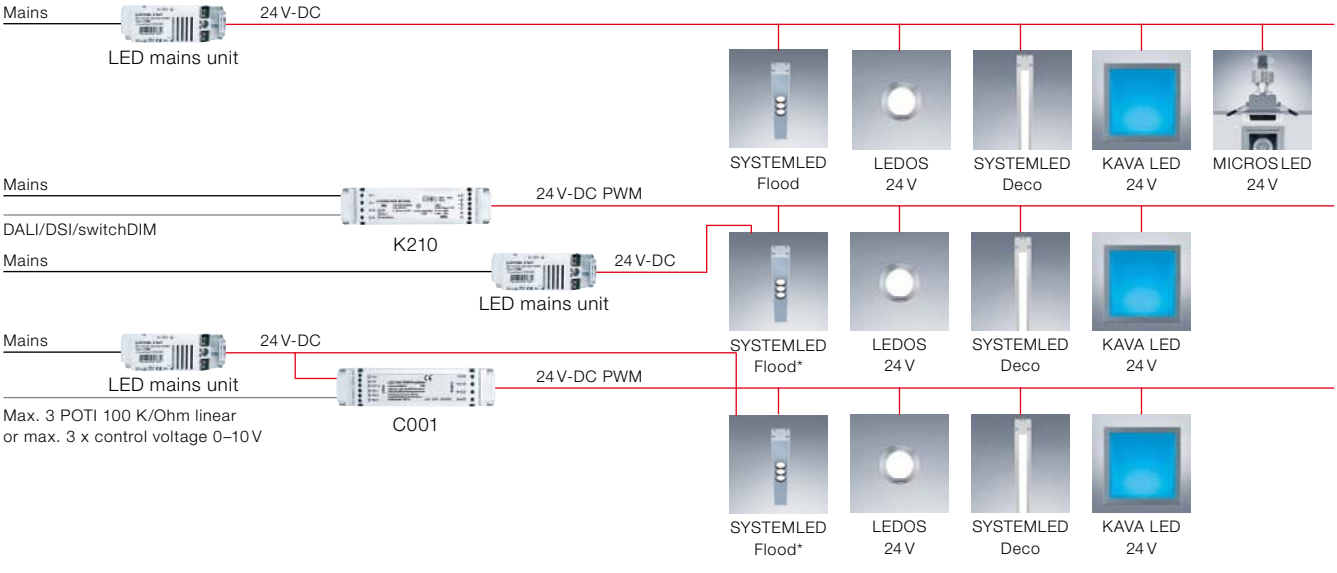
	Cable cross-section/length			
Electric current for LED luminaires	0.75 mm²	1 mm²	1.5 mm²	2.5 mm²
350 mA	30.0 m	40.0 m	60.0 m	100.0 m
700 mA	15.0 m	20.0 m	30.0 m	50.0 m

Cable length for supply of current-controlled LEDs, dimmable PWM

The maximum cable length to the last luminaire of a group must be no more than 13 m.
The cable cross-section must be > 0.25 mm².
For cable lengths greater than 1.5 m, shielded cable must be used.

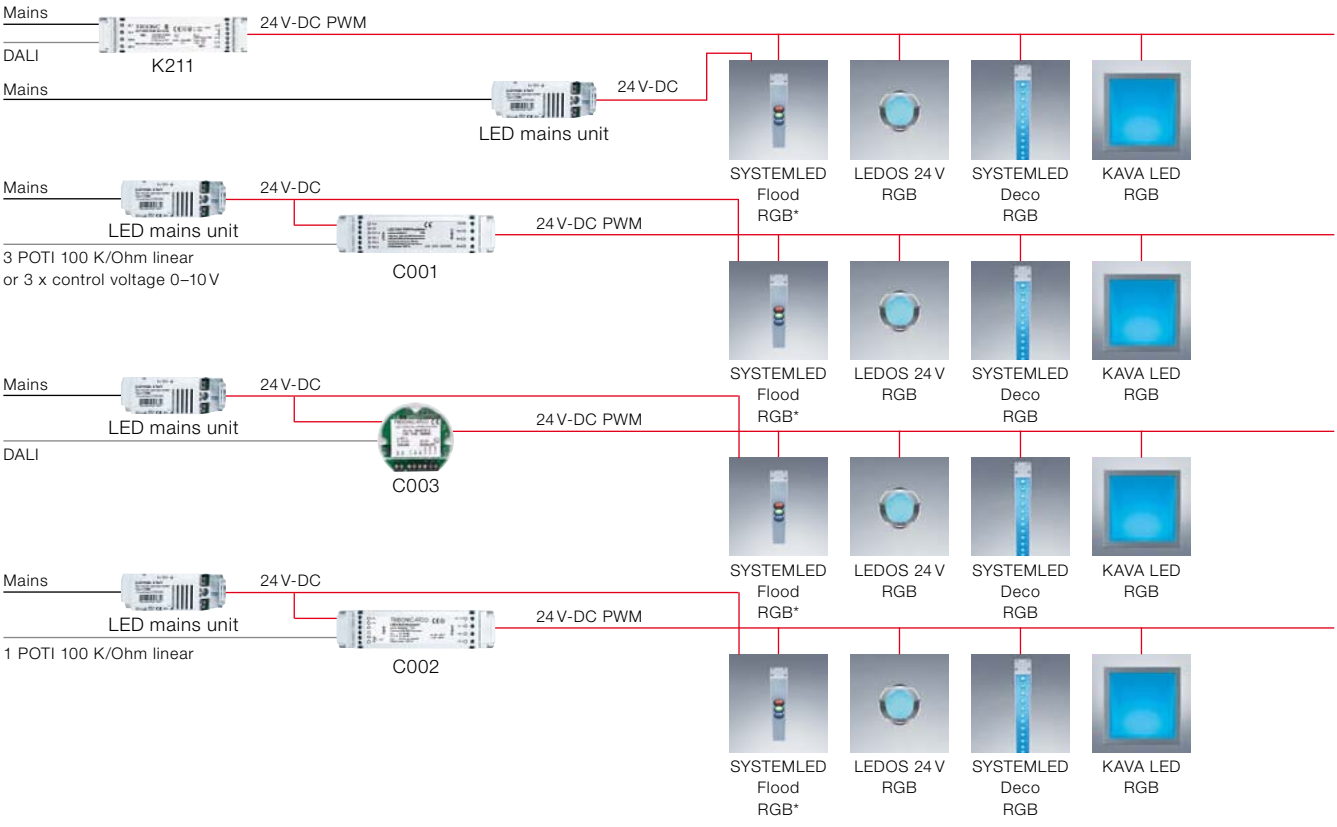
Basic arrays of LED installations

Monochrome LED luminaires, 24 V voltage-controlled



* These luminaires must be additionally supplied with 24 V DC supply voltage!

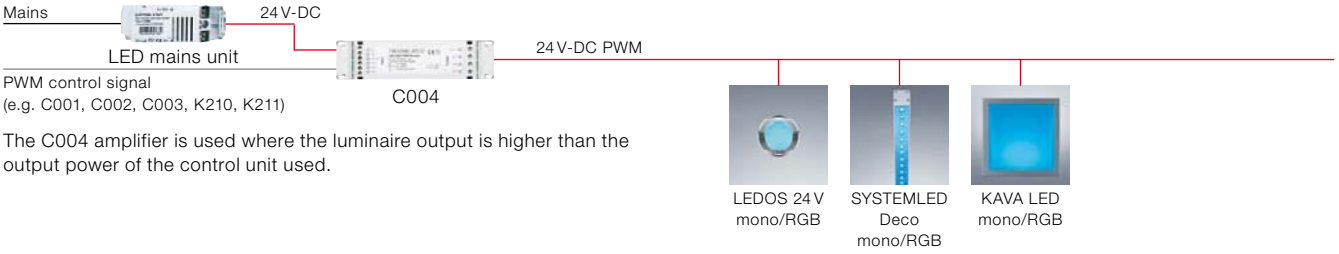
24 V RGB LED luminaires in dynamic colours



* These luminaires must be additionally supplied with 24 V DC supply voltage!

Basic arrays of LED installations

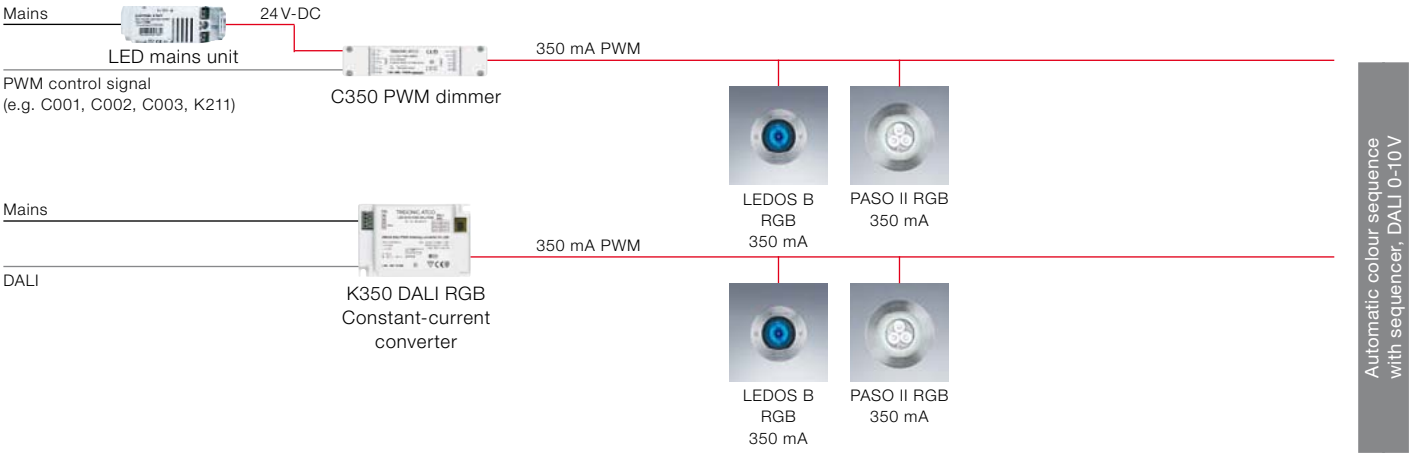
Application C004 PWM amplifier for controlling LED objects with higher output



The C004 amplifier is used where the luminaire output is higher than the output power of the control unit used.

350 mA monochrome LED luminaires, current-controlled

350 mA RGB LED luminaires in dynamic colours, current-controlled



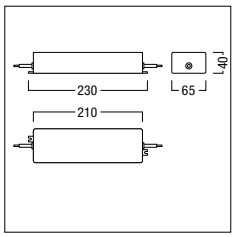
LED power supply units

Application / benefits

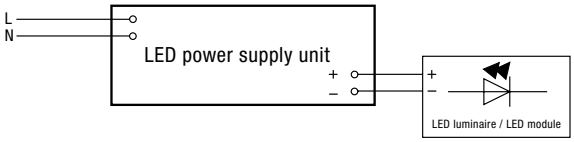
Current and voltage supply for 24 V DC LED luminaires.

Current and voltage supply for various control gear from the Zumtobel range (e.g. C001, C002, C003, C004).

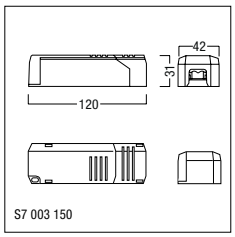
LED power supply unit IP67 100 W K240 (24 138 976)

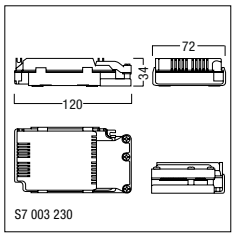


- Input voltage range 100–264 V AC / 120–240 V DC
- Output voltage 24 V DC (SELV)
- Power output 10–100 W
- Protection type IP67
- Protection class II
- Overtemperature protection
- Short-circuit breaking with automatic restart
- Connecting cable with wire end sleeves, length approx. 2.0 m

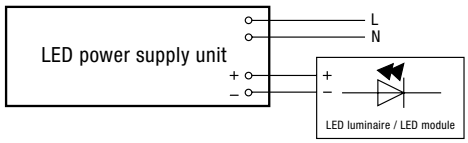


8 W or 25 W LED power supply unit (S7 003 150, S7 003 230)

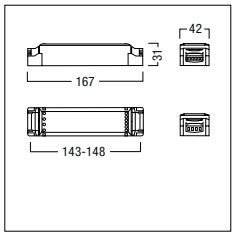




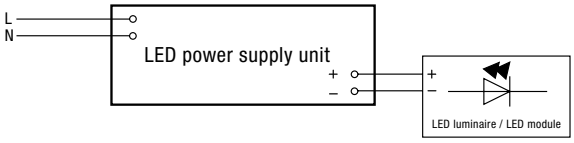
- Input voltage 230 V AC
- Output voltage 24 V DC (SELV)
- Power output 8 W or 25 W
- For interior rooms protected from moisture
- Protection class II
- Overtemperature protection
- Short-circuit breaking
- Integrated cable strain relief and terminal cover



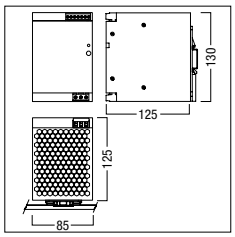
25 W LED power supply unit K201 (86 453 418)



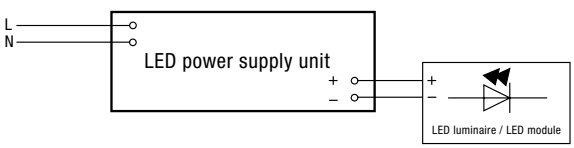
- Input voltage range 198-254 V AC / 200–240 V DC
- Output voltage 24 V DC (SELV)
- Power output 25 W
- For interiors protected from moisture
- Protection class II
- Short-circuit breaking with automatic restart
- Integrated cable strain relief and terminal cover
- 2/6-pole (primary/ secondary) screw terminal



240 W LED power supply unit (60 010 003)



- Input voltage range 85-264 V AC / 90-350 V DC
- Output voltage 24 V DC
- Power output 240 W
- For interiors protected from moisture
- Protection class I
- Short-circuit protection
- Mounted on DIN rail in switch cabinet
- Please note: in installations with longer cable lengths, output voltage at the power supply unit may be increased up to 28.5 V.



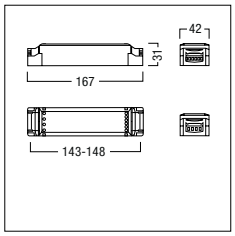
Dimmable LED power supply units and control units

Application / benefits

For dimming and controlling monochrome 24 V DC LED luminaires.

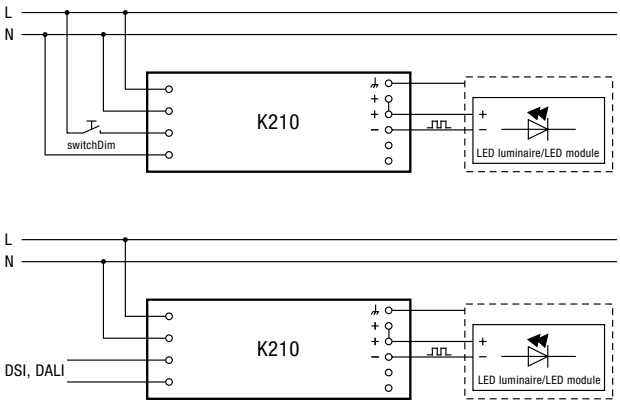
Three-channel control gear is suitable for RGB control in dynamic colours.

K210 electronically dimmable LED power supply unit (86 455 937)

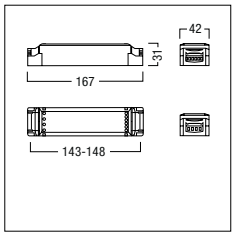


- Single-channel power supply unit
- Input voltage range 198–254 V AC / 200–240 V DC
- PWM output signal 24 V DC (SELV)

- Power output 25 W
- For interiors protected from moisture
- Protection class II
- Overtemperature protection
- Short-circuit breaking with automatic restart
- Integrated cable strain relief and terminal cover
- 4-pole primary and secondary screw terminal



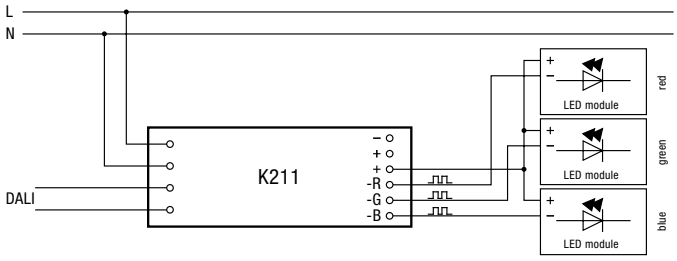
K211 electronically dimmable LED RGB power supply unit (86 455 066)



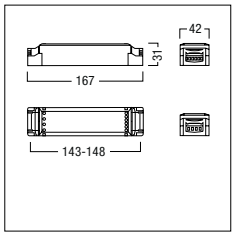
- Three-channel power supply unit
- Input voltage range 198–254 V AC / 200–240 V DC
- DALI control input
- 3 x PWM 24 V output signal (RGB)

- Output voltage 24 V DC (SELV)
- Power output 3 x 8 W
- For interiors protected from moisture
- Protection class II
- Overtemperature protection
- Short-circuit protection and overcurrent protection for output channels
- Integrated cable strain relief and terminal cover
- 4/6-pole (primary/secondary) screw terminal

- Integrated sequencer for “stand-alone” operation with pre-defined colour sequence (supplied in activated state)

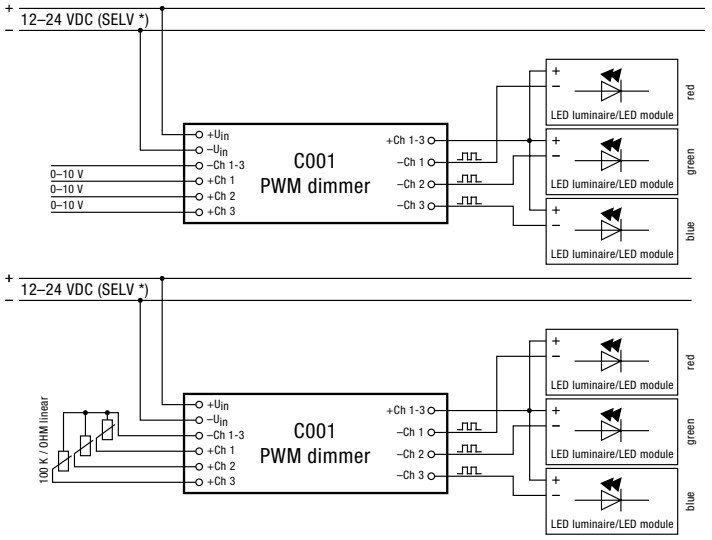


C001 LED PWM amplifier (86 454 974)

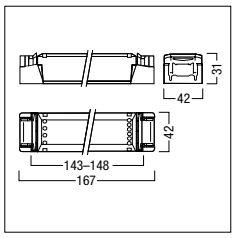


- Three-channel control unit
- Input voltage Uin 12–24 V DC (SELV)
- Max. input current 6 A
- Control inputs: 3 x analog 1–10 V, 3 100 kΩ linear potentiometers or 12–24 V DC PWM signal

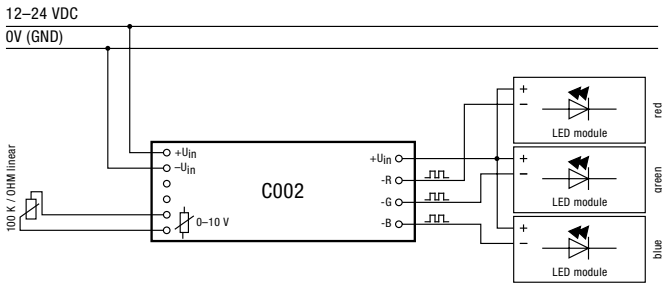
- 3 x PWM (RGB)
- Output voltage 12–24 V (SELV)
- Output current max. 2 A / channel
- For interiors protected from moisture
- Protection class III
- Overtemperature protection
- Short-circuit protection and overcurrent protection for output channels
- Integrated cable strain relief and terminal cover
- 4/6-pole (primary/secondary) screw terminal



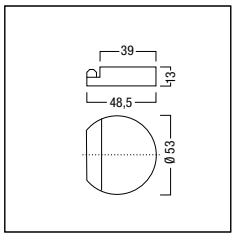
C002 LED RGB sequencer (86 454 968)



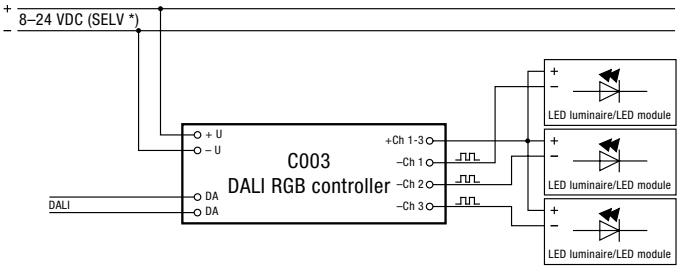
- 3-channel control unit with pre-programmed colour sequence
- Input voltage Uin 12–24 V DC
- Max. input current 6 A
- Control inputs: analog 1–10 V or 1 100 kΩ linear potentiometer
- 3 x PWM (RGB)
- Output voltage 12–24 V
- Output current max. 2 A / channel
- For interiors protected from moisture
- Protection class III
- Short-circuit breaking
- Integrated cable strain relief and terminal cover
- 4/6-pole (primary/secondary) screw terminal
- With a 100 kΩ potentiometer, colour sequence speed can be regulated



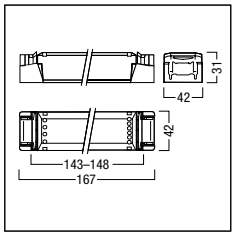
C003 DALI LED RGB controller (86 457 912)



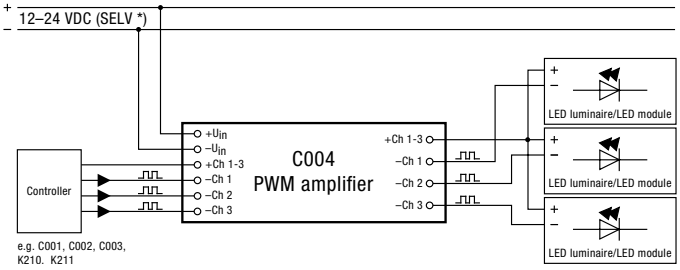
- Three-channel control unit
- Input voltage Uin 8–24 V DC (SELV)
- Max. input current 1.8 A
- DALI control input
- 3 x PWM (RGB)
- Output voltage 8–24 V (SELV)
- Output current max. 0.6 A / channel
- For interiors protected from moisture
- Protection class III
- Short-circuit breaking with automatic restart
- Overtemperature protection
- Screw terminals



C004 LED PWM booster (24 138 760)



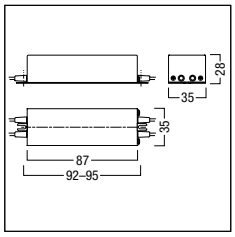
- Three-channel control unit
- Input voltage Uin 12–24 V DC (SELV)
- Max. input current 6 A
- Control inputs 3 x PWM signal 12–24 V
- 3 x PWM (RGB)
- Output voltage 12–24 V (SELV)
- Output current max. 2 A / channel
- For boosting of PWM signals at high power consumption
- For interiors protected from moisture
- Protection class III
- Overtemperature protection
- Short-circuit protection and overcurrent protection for output channels
- Integrated cable strain relief and terminal cover
- 4/6-pole (primary/secondary) screw terminal
- Suitable for combining with C001, C002, C003, K210, K211 control units



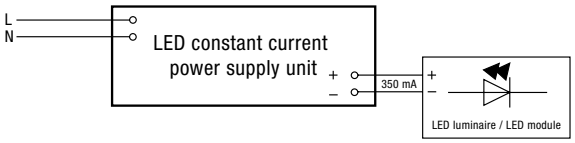
LED constant current power supply units

Application / benefits
Current and voltage supply for current-controlled LED luminaires (350 mA, 700 mA).

LED 350 mA constant current power supply unit (86 458 177)

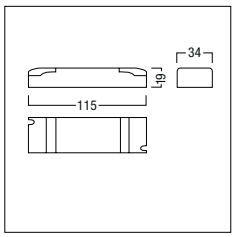


- Input voltage range 100–264 V AC / 120–240 V DC
- Output voltage 25 V DC (SELV)
- Output current 350 mA
- Power output 8 W
- Protection type IP67
- Overtemperature protection
- Short-circuit breaking with automatic restart
- Overload protection via power limitation
- Primary and secondary connecting cable approx. 0.5 m
- Please note: series connection on secondary side!

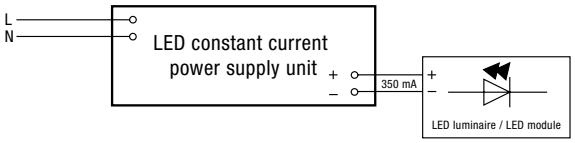


PLEASE NOTE: series connection

LED 350 mA constant current power supply unit (60 010 004, 60 010 005)

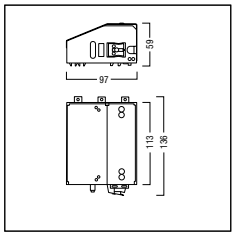


- Rated input voltage 95–240 V AC (60 010 004) or 220–240 V AC (60 010 005)
- Output voltage max. 34 V DC (60 010 004) or max. 48 V DC (60 010 005) (SELV)
- Output current 350 mA
- Power output 11.5 W (60 010 004) or 17 W (60 010 005)
- For interiors protected from moisture
- Protection class II
- Overtemperature protection
- Short-circuit protection
- Overvoltage protection
- Integrated cable strain relief and terminal cover
- Please note: series connection on secondary side!

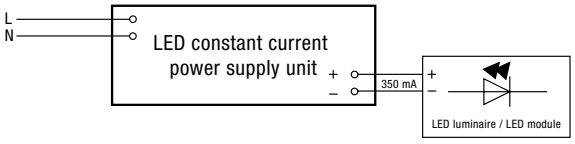


PLEASE NOTE: series connection

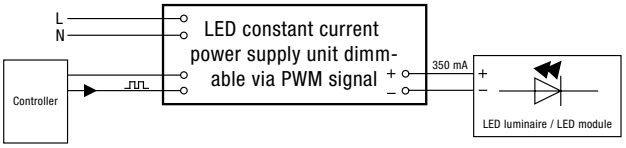
LED 350 mA constant current power supply unit (60 811 822, 60 811 823)



- Input voltage range 110–240 V AC / 170–240 V DC
- 60 811 823 has a PWM control input
- Output voltage 24 V DC
- Output current 350 mA
- Power output 8 W
- For interiors protected from moisture
- Through-wiring possible
- 60 811 823 is dimmable via PWM signal; the control gear unit automatically switches to 100% (emergency lighting mode) at 220 V DC
- Please note: series connection on secondary side!



PLEASE NOTE: series connection



e.g. C001, K210

PLEASE NOTE: series connection

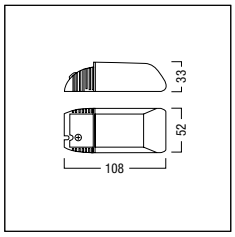
Dimmable LED constant current power supply units and control units

Application / benefits

For dimming and controlling current-controlled LED luminaires (350 mA, 700 mA).

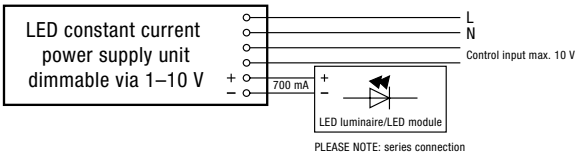
3- and 4-channel control gear units are suitable for RGB control in dynamic colours.

LED 700 mA constant current power supply unit, dimmable via 1-10 V (60 010 006)

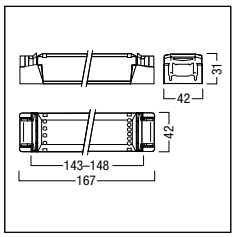


- Single-channel power supply unit
- Input voltage range 180–254 V AC
- Control voltage 1–10 V DC

- Output voltage 25 V DC
- Power output 17 W
- Output current 700 mA
- For interiors protected from moisture
- Overtemperature protection
- Short-circuit protection
- Overload protection
- Integrated cable strain relief and terminal cover
- Please note: series connection on secondary side!

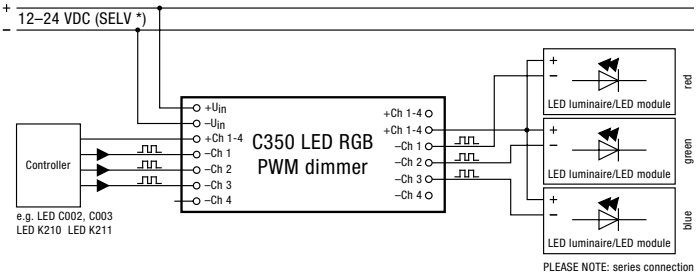


C350 LED RGB PWM dimmer (86 458 243)

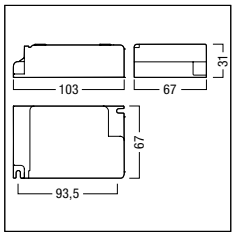


- 4-channel control unit
- Input voltage Uin 24–45 V DC (SELV)
- Max. input current 1.5 A

- Control inputs 4 x PWM signal 18–26 V
- Output voltage 2–20 V at 24 V input voltage / 25–41 V at 45 V input voltage
- Output current 4 x 350 mA per channel
- For interiors protected from moisture
- Please note: series connection on secondary side!

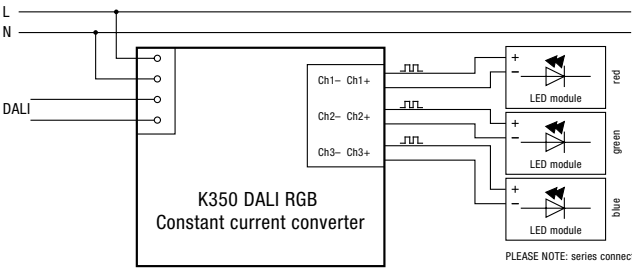


K350 DALI RGB constant current power supply unit (86 458 276)



- 3-channel mains unit
- Input voltage range 198–254 V AC / 200–240 V DC
- DALI control input
- Power output 18 W (max. 5 LEDs/channel)

- Output current 3 x 350 mA per channel
- For interiors protected from moisture
- Overtemperature protection
- 6-pole flat cable terminal for secondary side, 1 m flat cable included in supply
- Please note: series connection on secondary side!



Wiring diagrams for electricians

These wiring diagrams show the most common circuit types in practice.
Other combinations are possible. Subject to technical alterations.

Please note:
Quantity of luminaires is limited by cable length (see page 12) and wattage/current intensity.

For details concerning wattages/current intensities, see control gear overview.

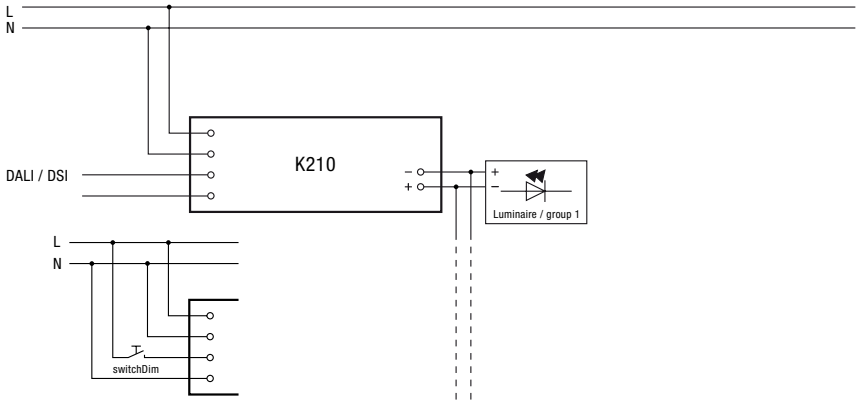
Example for calculation of current:
2 m SYSTEMLED DECO white,
each 10 W/m = 20 W, power supply voltage 24 V
4 KAVA, each 1.2 W = 4.8 W
I = current, P = watts, U = volts

I = P/U = 24.8 W*/24 V = 1.03 A

*With use of K210 power supply unit (power output 25 W)

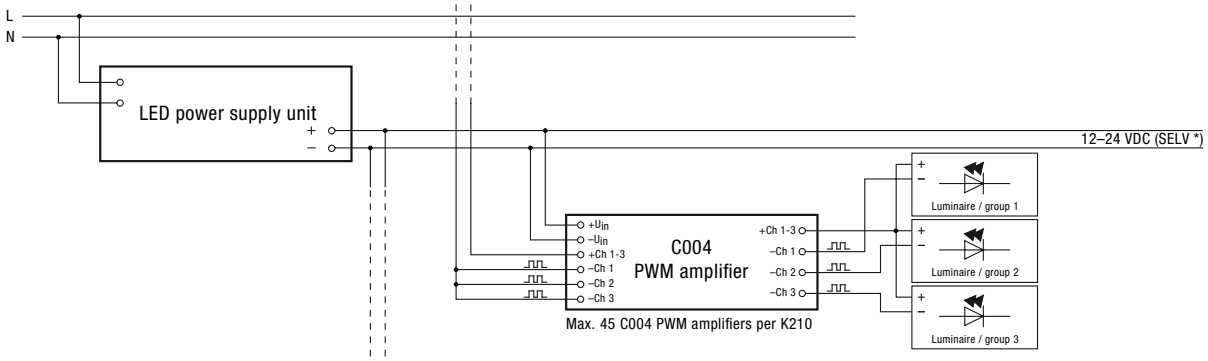
Dimmable LED luminaires, monochrome, 24 V voltage-controlled

DALI/DSI/switchDIM

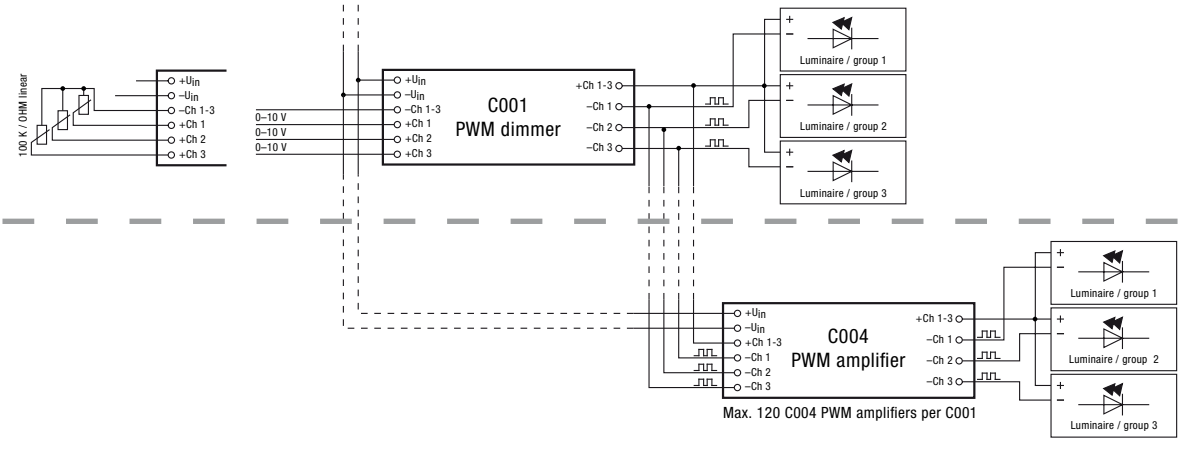


Use of C004 amplifier when luminaire output exceeds power output of control unit used.

LED objects with greater power consumption



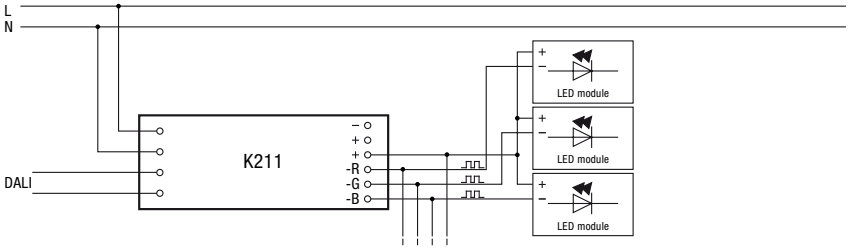
Potentiometer or 0–10 V



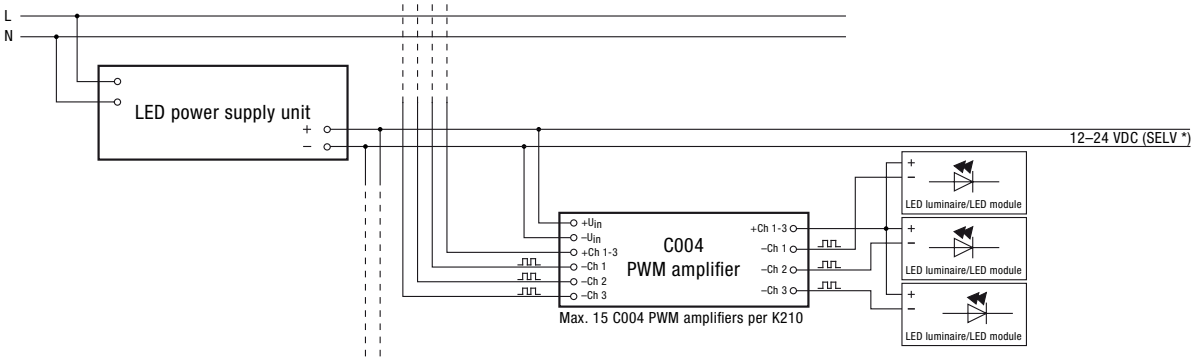
LED objects with greater power consumption

RGB LED luminaires in dynamic colours, 24 V voltage-controlled

DALI via K211

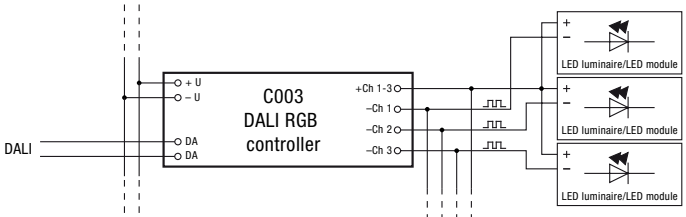


LED objects with greater power consumption

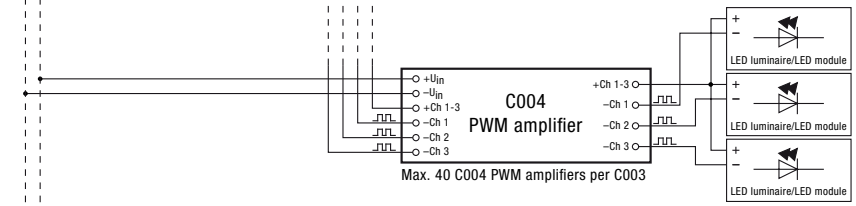


DALI via C003

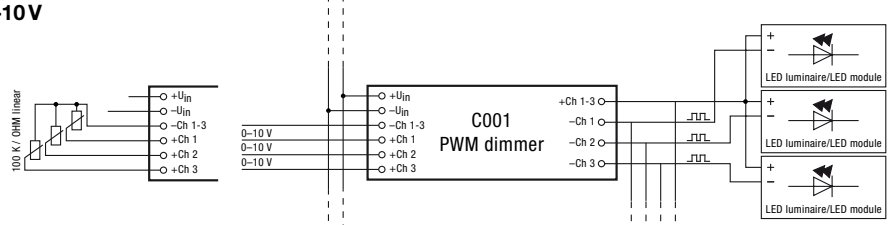
Use of C004 amplifier when luminaire output exceeds power output of control unit used.



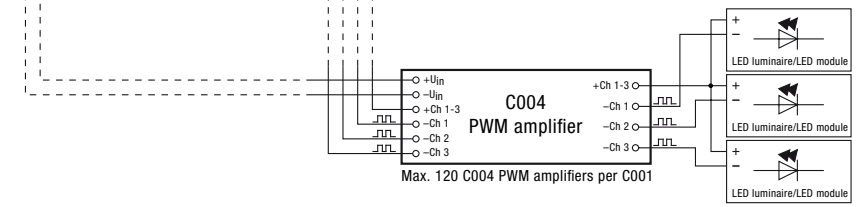
LED objects with greater power consumption



3 x potentiometer or 3 x 0–10 V

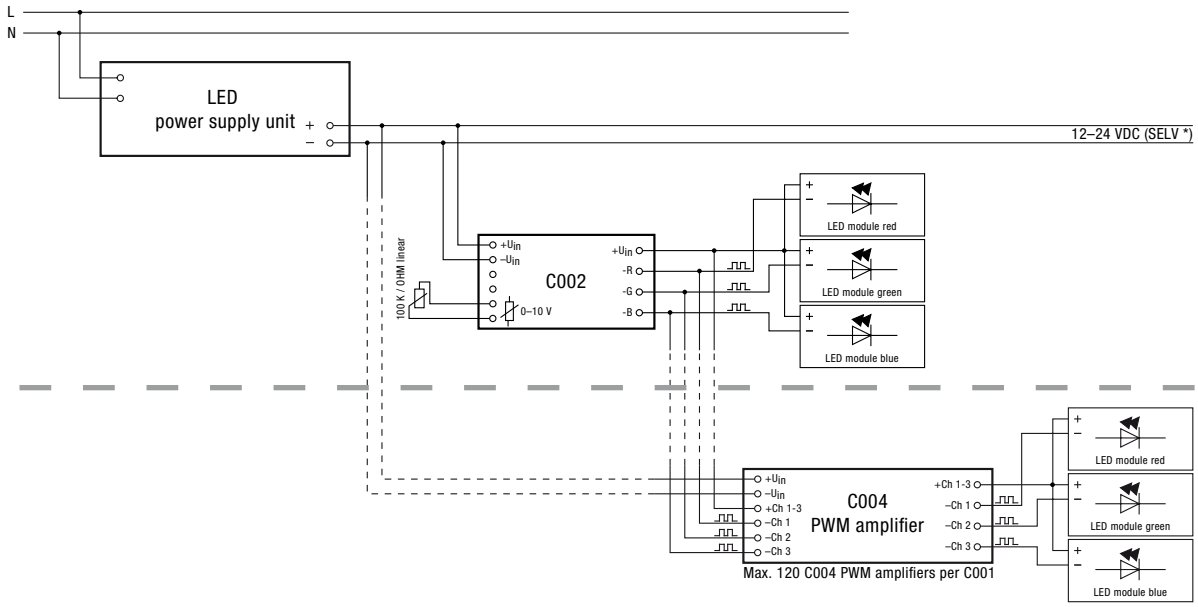


LED objects with greater power consumption



RGB LED luminaires in dynamic colours, 24 V voltage-controlled

Sequencer C002

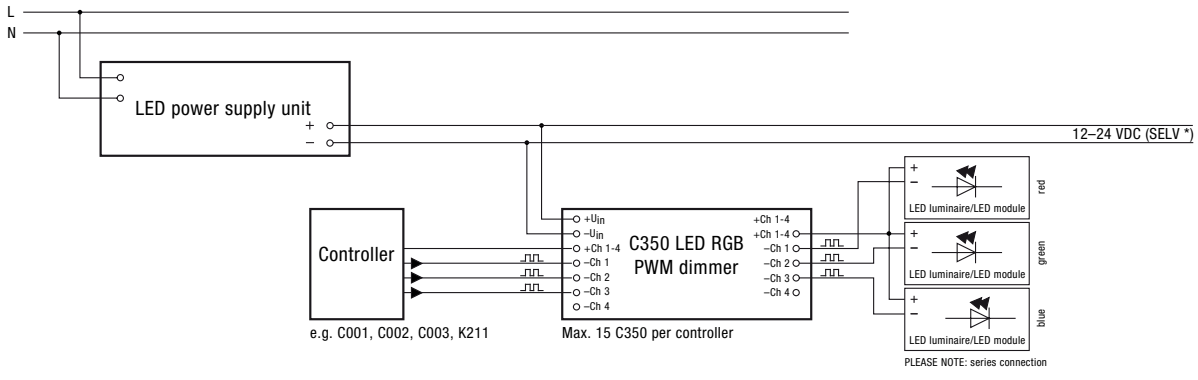


Use of C004 amplifier when luminaire output exceeds power output of control unit used.

LED objects with greater power consumption

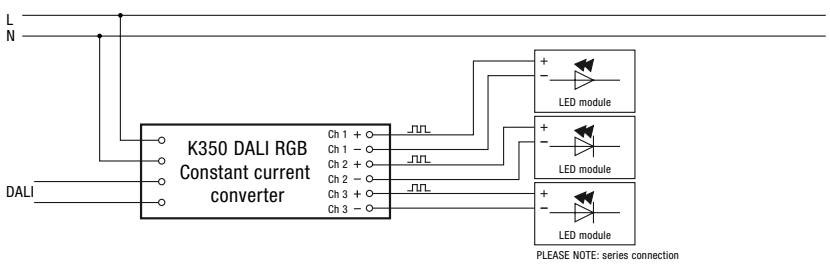
RGB LED luminaires in dynamic colours, 350 mA current-controlled

DALI, Poti, 0-10 V, sequenziometro



Where PASO II LED luminaires are used, a maximum of 5 luminaires can be connected to the controller.

DALI



Where PASO II LED luminaires are used, a maximum of 5 luminaires can be connected to the controller.

Useful accessories

Wiring in outdoor areas or damp areas

IP67 cable connector
(60 800 175)

Cable ends are inserted into the terminals as with a cable gland and sealed. The connection can be reopened at any time.

IP67 4 mm² cable connector
(60 800 343)

With this cable connector, feed lines can be fixed to an internal screw-connecting terminal. The connecting terminals are suitable for wire gauges of max. 4 mm² with max. 3 single conductors.

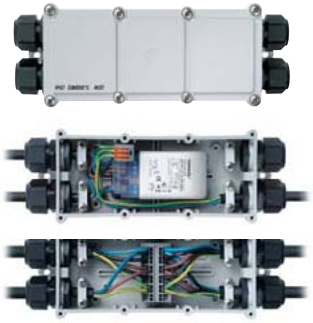
IP67 “mini” cable connector
(60 800 549)

This small IP67 connection box enables pressurised-water-tight connection of up to three suitable supply lines (H07RNF, etc.) for through-wiring outside of the luminaire unit. It can be used as an alternative to self-sealing adhesive tape or welded sleeves.

IP67 “mini” multipurpose box
(60 800 432)

This small IP67 connection box enables pressurised-water-tight connection of up to three suitable supply lines (H07RNF, etc.) for through-wiring outside of the luminaire unit. It can be used as an alternative to self-sealing adhesive tape or welded sleeves.

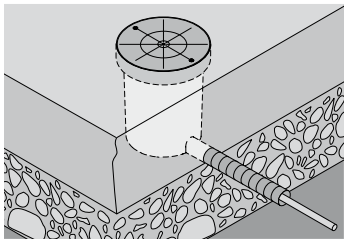
IP67 multipurpose box
(60 800 235)



The IP67 multipurpose box is used in damp areas or for outdoor applications in combination with the small PASO II S. It is a safe depository for external control gear. Appropriate cables can be laid with through-wiring or crosswise wiring to terminals with a cable diameter of 0.8 to 2.5 mm. Halogen transformers and LED power supply units are also suitably protected.

Tips and tricks

Drainage:
With outdoor installation of recessed floor luminaires, sufficient drainage must be ensured – at least 30 cm of pebbles.



With concrete ceilings directly exposed to rain, we categorically recommend an on-site seeping duct allowing water to escape.

Installation:
We recommend that recessed floor luminaires are not installed during rain, fog or highly humid conditions.
Before installation, the inner of the luminaire housing and sealings must be inspected and freed from dirt and moisture.

Installation in asphalt:
Casting surrounds by Zumtobel may be installed in asphalt surfaces. However, the asphalt must have cooled down to 80 °C. Only then can it be spread by hand around the housings.

Installation cable:
We recommend silicone sheathed cables for installation under ground. This ensures optimal sealing of cable entry in the cable gland. In addition, outer cables should be able to withstand strong temperature fluctuations and be UV-protected to prevent embrittlement.

Cable routing for LED installations:
We recommend always using stranded wire on the secondary side between power supply unit and luminaire for the LED installation.
With installations where mixed frequencies or voltages may occur in close proximity, we categorically recommend use of shielded cable, e.g. in cable ducts, cable climbing assemblies etc.

Earthed working with LED boards:
Never touch LED boards with bare hands, except when you are in an ESD-protected area.

FAQs

Can I use LED luminaires in a saline environment?
No, our luminaire housings are made of aluminium – the salt would attack and decompose the housings within a few months.

We are unable to incorporate drainage into our project. Is there an alternative for allowing rainwater to escape?
Drainage is intended to prevent backwater to the luminaire, and may also be implemented with a hose or tube leading water off to a lower storey or into an outflow. Ledos M IP68 can be installed without drainage. Drainage is only necessary where luminaires are installed in the ground. With wall or ceiling installation, there is generally no danger from backwater.

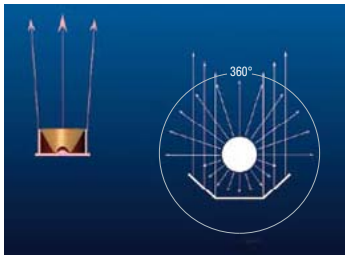
What does 350 mA mean?
This has to do with current-controlled LEDs. These must not be connected to a 24 V transformer or directly to 30 V. We offer special 350 mA constant current power supply units for this purpose.

Do LEDs have to be cooled?
Yes! If an LED is not cooled, it will "burn up" inside. Service life will then be reduced to a few hundred hours. Most LED luminaires are cooled via their housing. With the latest LED luminaires, fan cooling or water cooling is also used.

LEDs and sunlight?
Our luminaires are generally suitable for use in ambient temperatures of 25 °C. With incident sunlight or with luminaires installed on a façade, for example, these temperatures may be much higher. In Northern and Central European zones, this level of sunlight is non-critical as long as the luminaires are not switched on for the duration of sunlight exposure.

Laser classification
With luminaires governed by the laser regulations, legislators demand explicit designation. This is found in the technical documentation. The luminaires are marked with stickers.

Is LED technology energy-saving and economically efficient?
Yes! In a superficial comparison with conventional fluorescent lamps, LEDs only have a small advantage in terms of light output ratio when considering lumens/watts. If however we consider the component of useable light (see figure), the advantages that LEDs offer are more clearly seen. And in terms of service life, LEDs with approximately 50 000 hours are easily superior to the fluorescent lamp.



Where is LED development heading to?
LED technology is quite plainly going in the direction of illumination, and in the near future will be able to supplement fluorescent and discharge lamps. There will be standardised, replaceable LED modules. In the future, LED modules will be able to supply a constant luminous flux throughout their complete service life. Exchangeability or system expansion will be possible and no differences in illumination output or colour temperature will be detectable. Colour rendition and illumination output will be significantly improved.

That's all too complicated for my electrician/planner. Where can he get help?
For consultation on-site or for professional LED lighting design, please contact your Zumtobel expert.

Notes

ZUMTOBEL

Track and Spots

Modular Lighting Systems

Down-/Uplights

Recessed Luminaires

Surface-mounted and Pendant Luminaires

LED, Task, Wall and Uplights

Continuous Row and Batten Luminaires

High-bay Luminaires

Luminaires with Extra Protection

Lighting Management

Emergency Lighting

Medical Supply Systems

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LED guide

Design, planning and installation guide with tips and tricks for the use of LED installations.